REMARKS

Discussion of Objection to Drawings

The Examiner has objected to Figure 4A. Applicant submits a substitute Figure 4A with the legend "(Prior Art)". Applicant respectfully believes the substitute drawing overcomes the objection.

Discussion of Rejections Under 35 USC §103(a)

The Examiner has rejected Claims 2-4 and 19 under 35 USC §103(a) as allegedly unpatentable over Wade (US 5,286,316) in view of JP 61-119645A (JP '645). The Examiner has rejected Claims 7-9, 15-17, and 20 under 35 USC §103(a) as allegedly unpatentable over Wade and JP '645 in view of Metals Handbook:Desk Edition, page 428. The Examiner has rejected Claims 11-13 under 35 USC §103(a) as allegedly unpatentable over Wade and JP '645 in view of Sircar (US 5,976,278). Additionally, the Examiner has rejected Claims 2-4 under 35 USC §103(a) as allegedly unpatentable over Gullotti, et al. (US 3,990,922) and JP 61-052346A (JP '346). The Examiner contends that the cited references teach or suggest all of the claimed features.

Claims 2 and 3 are amended to include "homogenizing an aluminum alloy ingot containing about 0.8 to about 1.5 wt% Mn." Furthermore, Claims 2-3 and 7-8 include where "an electric conductivity value becomes at least 39.0 IACS%."

The theme of the claimed invention is to determine the homogenization conditions which reduce preferential corrosion in port hole extrusion relating to both (1) aluminum alloy containing 0.8-1.5wt% Mn and (2) aluminum alloy containing 0.8-1.5wt% Mn, 0.1-0.7wt% Fe, 0.03-0.6wt% Si, and additionally consisting of 1 or at least 2 of 0.00-0.45wt% Cu, 0.0-0.3wt% Mg, 0.0-0.3wt% Cr, 0.0-0.1wt% Ti, 0.0-0.5wt% Zn, 0.0-0.3wt% Zr, 0.0-0.3wt% Ni, and the balance Al and any unavoidable impurities. Preferential corrosion originates from the difference in the structure of the welding portion of port-hole extruded material.

The problem of preferential corrosion is not stated anywhere in the cited references mentioned by the Examiner. The claims, as detailed in the specification, show that the preferential corrosion in the welding portion can be reduced by precipitating in advance the Mn-contained compounds with ingot homogenization treatment prior to extrusion.

Preferential corrosion generally refers to the fact that, in the case of contacting two different metals, the difference in electric potential makes one of the above two metals corrosive

preferentially. But in the case of the claimed invention, there is not the general problem of corrosion resistance nor the problem of preferential corrosion. Methods for providing overall corrosion resistance are not necessarily effective in minimizing the difference in corrosion resistance by material location of the welding portion and non-welding portion in the same material. The present invention helps resolve the problem of differences in corrosion resistance between the same materials, namely, corrosion resistance of the welding portion and non-welding portion of port-hole extruded material. This problem is not contemplated at all by the prior art of record.

And then, it is clear, as shown in Table 7 of the specification, that corrosion of extruded material occurs at the front end of the extrusion more easily than at the rear end of the extrusion. Therefore, it is necessary to control the precipitation condition of the material to ensure preferential corrosion across the total length. To ensure preferential corrosion across the total length of the extruded material, it is necessary to limit the lengthwise extrusion dimensions (longitudinal direction for extrusion) of electric conductivity. Thus, the claims include limitations on the lengthwise consistency of conductivity. This is not taught or suggested in the prior art.

Furthermore, regarding the general corrosion resistance of aluminum alloys, it is known that AA3000 series 3003 alloys or Al-Mn series alloys are generally better in corrosion resistance than 1000 series alloys such as AA1050 or AA1100. However, reducing preferential corrosion resistance requires specific homogenization techniques, not just material selection. Therefore, unless preferential corrosion, which is the subject of the claimed invention (the effects of the difference in corrosion resistance between the welded joint portion and the welded non-joint portion of extruded material) are expressly mentioned, the cited documents are no more than technical background about general corrosion resistance of aluminum alloys and cannot be a basis for an obviousness rejection of the claimed invention as there is no motivation to combine, and the results when combined are unexpected.

If the Examiner asserts that the claimed invention can be produced by the combination of the cited references, we request the Examiner show any document which mentions the problem related to the preferential corrosion in the extruded material of aluminum alloy and the means to solve this problem.

(1) Comparison with Wade

The Wade document cited (approximately 0.1wt%-0.5wt% Mn) is a material with the composition different from the claimed invention, which contains 0.8-1.3wt% Mn, and moreover, there is nothing mentioned about preferential corrosion in the purpose of the invention.

Therefore, the material is different both in the alloy composition and the subject of invention.

Furthermore, the homogenization temperature in Wade's invention is 593°C × 24 hours + 510°C × 24 hours, which is different from the claimed invention, in which the homogenization condition is maintained at 500-630°C (T1) for 0-24 hours, and then is cooled to the range of 400-500°C (T2) at a cooling velocity below 100°C/h, and is maintained at T2 for 4-48 hours. The Examiner took a precedent to say 510°C can be regarded identical to 500°C. But because the second temperature maintained in our invention at 510°C described in Wade's invention has no effect of invention, the temperature was excluded. Furthermore, the term "about" has been removed from the claim.

Furthermore, another homogenization condition of the claimed invention is maintaining 500-630°C for 0-16 hours and then cooling from that temperature to 350°C for 10 to 48 hours at a cooling velocity at 100°C/h or less. But this cited reference does not mention anything about cooling to a comparatively low temperature of 350°C.

(2) Comparison with Cited Documents Gullotti and JP61-52346

Gullotti and JP61-52346 show Al-Mg-Si series alloys, in which Mn or Zr is added to the main component of Al-Mg-Si. In contrast to this, the claimed invention relates to Al-Mn series alloys, so both cited references are entirely different from the claimed invention in the alloy composition range of Mn and Mg.

And Gullotti (aluminum alloy containing Mn 0.15wt% or less and Mg 0.8-1.2wt%) describes that precipitation of Mg_2Si is controlled by the homogenization, and that by controlling this, high extruding rate, improvement of mechanical properties and prevention of surface cracks are accomplished, but describes nothing about the problem of preferential corrosion in the

welded joint portion in port hole extrusion die. The cited reference is different from the present invention in subject and alloy composition.

Claim 3 is about slow cooling for 10 to 48 hours to 350°C in the second stage of the homogenization process, and cooling to a comparatively low temperature as 350°C is not described in these cited references. Therefore, in either of alloy composition or homogenizing condition, Claim 3 does not agree with the Cited Document.

Further, in JP61-52346 (aluminum alloy containing 0.05-0.5wt% Mn and 0.4-1.2wt% Mg) is described an aluminum alloy for spacer ring using port hole extruded material. The purposes of this are to aim at refining the extrusion structure, prevent the occurrence of coarsening in the welded joint portion, and improve the smoothness of the cut face. In this point, the subject of JP61-52346 is different from the claimed invention, which takes prevention of preferential corrosion as a subject. And, the alloy composition of JP61-52346 is different from the claimed invention in the composition range of Mn and Mg and additionally in whether Zr is added or not. Therefore, the composition of JP61-52346 is entirely different from that of the present invention.

Furthermore, as a homogenizing condition, the condition of 480-580°C × (1-24)h is mentioned in JP61-52346, but this is entirely different from the second step homogenizing condition of the claimed invention or slow cooling for a predetermined time at a predetermined cooling velocity down to 350°C at the 2nd step temperature (maintaining 0 hours) after the first homogenization step.

(3) Comparison with Sircar

In the cited reference of Sicar (aluminum alloy containing about 0.1-about 1.5wt% Mn and 1.0wt% or less of Mg) there is described an excellent aluminum alloy in corrosion resistance, drawability, and bendability, and in this invention, the method of manufacturing the material is described from lines 4 to 20 in the 5th column. Hot worked materials including extrusion and hot working, cold working, reheating and conducting solution treatment are described, and it is described on the 15th line in the 5th column that homogenization was conducted in the conventional method. But specific conditions are not mentioned.

The preferential corrosion condition of the claimed invention is not dealt with, as nothing is mentioned on the homogenization condition and corrosion resistance is generally covered, although corrosion resistance and plasticity are taken as objects.

Actually in Table 3, the results of corrosion tests are described, and the entire corrosion and the difference in general corrosion by the alloy composition of the form such as pit corrosion are described but the difference in corrosion resistance between the welded joint portion and welded non-joint portion is not described at all. In the cited reference of Sircar, corrosion resistance or plasticity between alloys are evaluated with the goal of improving alloys. Accordingly, although the compositions of the present invention and Sircar agree with each other, the confirmed agreement of them cannot be found in the subject and in the method of manufacturing the materials. Therefore, it has nothing to do with the method of preventing preferential corrosion of the claimed invention.

(4) Regarding the Metals Handbook

In 3105 of Metals Handbook, Mn is 0.2-0.8wt%, so only 0.8wt% of Mn content agrees, but in the part exceeding 0.8wt%, the two (the present invention and 3105) are different from each other. Alloy 3003 includes the part where the alloy composition agrees, but, here, it is problematic to talk about only the agreement of the composition, as neither the subject nor the means to solve the preferential corrosion problem are shown for the method of the claimed invention. Alloy 3003 is good enough to talk about the agreement of composition, but there is no discussion or suggestion of the claimed processes. Thus, the information provided in the Metals Handbook provides no motivation to modify any of the other references cited by the Examiner.

(5) Regarding numerical limitation of electric conductivity

And, this time, in all the claims, the difference in electric conductivity by the lengthwise part (longitudinal direction) of hollow material as a product does not exceed 1 IACS% and the requirements for preventing preferential corrosion have been limited by conducting homogenization so that the electric conductivity value can be at least 39.0 IACS%. In order to compensate, across the whole length of the extruded material, the delicate problem called the preferential corrosion resistance between welding portion and non-welding portion of the material in the same material, namely, preferential corrosion, it is necessary to limit electric conductivity as mentioned above. But these characteristics are not described in any of the cited references.

The Examiner concedes that the cited references fail to disclose the claimed range of electric conductivity. As discussed in Applicant's specification, *identical* aluminum alloys subjected to similar homogenizing treatments result in vastly different values for the difference in

electric conductivity of individual portions in a lengthwise direction of the hollow material. (Tables 1 and 2). Thus, the Examiner's contention that Wade's *similar* process performed on *similar* composition results in the same difference in electric conductivity of not more than 1 IACS% is rebutted by Applicant's original test data which shows that *identical* alloy compositions prepared according to similar homogenization processes result in vastly differing difference in electric conductivity. Because Applicant has shown that *identical* alloy compositions prepared according to different (but perhaps similar) processes do not produce the claimed range of electrical conductivity, it is improper to conclude that *similar* compositions prepared according to similar processes would produce the claimed properties. Thus, Applicant's data in Tables 1 and 2 is believed to overcome the Examiner's contentions regarding the electrical conductivity properties of the materials in Wade.

Because neither object of invention nor requirements are described and the methods of achieving it do not agree one another, the present claims cannot be rejected by the cited references mentioned by the Examiner.

(6) Regarding striations in the surface of the drawn pipe

New Claims 23 and 24 recite where the surface fine striations of the drawn pipe are excellent. As shown in Applicant's Figure 4(B) and in the associated discussion, the claimed process results in excellent surface fine striations compared to the result shown in Figure 4(A).

None of the references cited by the Examiner discuss striations in drawn pipe material or suggest that the disclosed alloys or processes have any affect on the surface striations. The Wade reference shows illustrations from a scanning electron microscope (Figures 4a and 4b) to discuss the results of corrosion testing. However, there is no discussion of the striations of drawn pipe. Gullotti discusses generally surface checking or chatter cracks. However, the composition discussed in Gullotti is different from the claimed composition so that there can be no correlation between any of the properties discussed in Gullotti with the properties of the drawn pipe of the claims. Similarly, Sircar discusses "stretcher strains" but includes no discussion of the claimed homogenization conditions. The metals handbook contains no discussion of either striations of drawn pipe or of the process by which any of the materials are subjected. The excellent plasticity of the materials produced according to the methods described herein is another reason that the references cited do not render the claimed inventions obvious.

CONCLUSION

Applicant submits with this amendment a corrected drawing to overcome the Examiner's objection to Figure 4A.

With respect to Claims 2 and 3, the cited references, either alone or in combination, fail to disclose the range of Mn nor the claimed range of IACS%. The cited references, either alone or in combination, also fail to disclose the claimed range of electric conductivity from Claims 2-3 and 7-8. Thus, Applicant respectfully requests reconsideration and allowance of Claims 2-3 and 7-8.

Claims 11-12 depend from Claims 2 and 3, respectively, and are believed to be allowable at least for the reason that they depend from an allowable base claim. Thus, Applicant respectfully requests reconsideration and allowance of Claims 11-12.

Applicant respectfully believes that new Claims 23-28 are allowable at least for the reasons presented above with respect to Claims 2-3 and 7-8. Applicant requests allowance of new Claims 23-28.

The Examiner has indicated that Claims 5, 10, 14, 18, and 21-22 are allowable.

Applicant has endeavored to address all of the Examiner's concerns as expressed in the outstanding Office Action. Accordingly, amendments to the claims for patentability purposes pursuant to 35 U.S.C. § 103, the reasons therefor, and arguments in support of the patentability of the pending claim set are presented above. In light of these amendments and remarks, reconsideration and withdrawal of the outstanding rejections is respectfully requested. Applicant submits that the claim limitations discussed above represent only illustrative distinctions. Hence, there may be other patentable features that distinguish the claimed invention from the prior art.

If there are any impediments to allowance of the claims that can be resolved with a telephone call, the Examiner is respectfully invited to call the undersigned.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: 7/25/03

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